

14. (New) The refrigeration system of claim 7 wherein said motor means has a power factor of at least 0.89 and said means for varying the speed of said motor means operates at an input power factor of at least 0.99 when driving said motor means.

15. (New) The refrigeration system of claim 8 wherein said motor means has a power factor of at least 0.89 and said means for varying the speed of said motor means operates at an input power factor of at least 0.99 when driving said motor means.

16. (New) The method of claim 10 further including the step of selecting means for cooling said variable speed drive with refrigerant from said refrigeration system.

17. (New) The method of claim 16 further including the steps of:
selecting means for sensing the temperature of water leaving the chiller;
and

selecting means for controlling the speed of said motor solely responsive to the sensed temperature of the water leaving the chiller.

REMARKS

Claims 1-10 remain in the application and claims 11-17 have been added. A marked up copy of pages 1 and 5 of the Specification are provided as an attachment.

The election of Group 1, claims 1-8, with traverse, is hereby affirmed. The newly added dependent claims add limitations to the claims of each group that remove the claim limit distinctions upon which the Examiner based his election requirement. Specifically, claims 11-15 add limitations relative to the power factor of the motor means and means for varying the speed of the motor means to the claims of elected Group 1 and claims 16

and 17 add the steps of selecting means for cooling the variable speed drive with refrigerant and for varying the motor speed responsive to the sensed temperature of water leaving the chiller to the claims of Group II. Because both groups of claims contain corresponding claim limitations, it is believed that the election requirement should be withdrawn and that all of the claims should be examined.

The present invention is directed to the designing of a refrigeration system. Starting with the design system capacity, a suitable compressor is selected in conjunction with a suitable motor. A variable speed drive is selected which may be refrigerant cooled in order to provide greater capacity. The compressor is controlled solely by a variable speed drive which controls the motor of the compressor by virtue of varying the frequency of the electric current provided to the motor. The motor has a power factor of at least 0.89 and the variable speed drive is cooled by refrigerant from the refrigeration system, has an input power factor of at least 0.99 and is operated solely responsive to the sensed temperature of water leaving said chiller. All control of the compressor is through the variable speed drive.

The Clemens et al. patent, as stated in the first sentence of the Specification, "relates to a compression refrigeration machine having ammonia as refrigerant." The difficulties associated with the use of ammonia as refrigerant are discussed as at column 1, lines 43 to 57 and 61 to 65 and column 2, lines 26-34 and the invention is directed to overcoming the difficulties associated with the use of ammonia as refrigerant. The speed control system of Clemens et al. is added to an existing chiller which is what the present invention says is wrong because the original system has to have some sort of mechanical unloader and the speed control is an afterthought. This should be contrasted with the present invention which designs a system from scratch so as to be solely electronically unloaded, i.e. not a mechanical system to which a variable speed drive is added as is the case in the Clements et al. device.

The Stark patent teaches the use of refrigerant for cooling a variable speed drive.

The Arthur patent discloses a refrigeration system operable at different voltages.

The other references have been considered.

Claims 1-4, 6 and 7 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Clemens et al. in view of Stark. Independent claims 1 and 6 each require (1) "means for providing cooling to said means for varying the speed"; (2) "means for sensing the temperature of water leaving said chiller"; and (3) "means for controlling said means for varying the speed responsive to the sensed temperature of water leaving said chiller" all of which are absent in Clemens et al. Additionally, claim 6 further requires economizer structure of a type which is absent in Clemens et al. As noted above, the Clemens et al. patent is directed to a compression refrigeration machine using ammonia as the refrigerant and only applies to ammonia refrigeration systems. Ammonia is a strongly alkaline gas which presents corrosion problems as discussed by Clemens et al. Accepting, arguendo, that Stark teaches the use of condensed refrigerant to cool control electronics, this teaching is not applicable to the Clemens et al. invention since ammonia, the refrigerant which is central to the Clemens et al. invention, is corrosive and the use of "the teaching of Stark to modify the cooling system of Clemens et al." would not, as the Examiner states, "eliminate the need for a separate cooling system while still ensuring proper functioning and reliability of the control electronics" (emphasis supplied). Further, Stark does not teach "means for sensing the temperature of water leaving said chiller" and "means for controlling said means for varying the speed responsive to the sensed temperature of water leaving said chiller" as required by independent claims 1 and 6 or the economizer structure further required by claim 6. The economizer structure of Clemens et al. is associated with a second evaporator which provides cooling at a different temperature than the other evaporator. In the Figure 16 device, which is the closest to the present invention in economizer structure, valves 85 and 87 are present and provide speed control contrary to the present invention (see column 10, lines 7-12) which uses frequency. Dependent claim 4 further requires that

"said means for controlling said means for varying the speed acts solely responsive to the sensed temperature of water leaving said chiller" which is not taught in the proposed modified device. Claims 2-4 and 7 define over the references for the same reasons as the independent claims from which they depend.

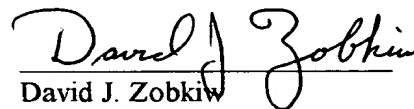
Claims 5 and 8 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Clemens et al. in view of Stark as applied to claims 1-4, 6 and 7, as above, and further in view of Arthur. Accepting, arguendo, the Examiner's characterization of Arthur, Arthur still does not provide the deficiencies of Clemens et al. noted with respect to parent claims 1 and 6.

Newly added dependent claims 11-15 add limitations as to the power factor of the motor and variable speed drive and these features are not disclosed in the references.

For the reasons set forth above it is believed that claims 1-8 and 11-15 define over the references of record and are now in condition for allowance. It is further believed that in view of the limitations of the newly added dependent claims, the distinctions between Group I and Group II have been eliminated and the all of the claims should be examined in the present application.

Reconsideration of the rejection of claims 1-8 and the election requirement are hereby requested.

Respectfully submitted,
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